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CIVILIAN CONTRACT AIR REFUELING:

INNOVATIVE OR INSANE?

by

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Preface

I'd like thank my Air Command and Staff College faculty advisor, Colonel Steve German—an air power and air refueling advocate who is as much of a 'workhorse' as the famed KC-135.

Also, a little insight on why I chose this topic. In 1996 I worked in the Tanker Airlift Control Center as a channel airlift director. I sat across from two individuals responsible for tasking airlift and air refueling assets. One day an airlift barrel master, directed an airlift mission to a civilian contractor and his tanker counterpart remarked, "I wish I could call a civilian contractor whenever my tasking levels got too high." An idea was born…

Abstract

Over the last 10 years Air Mobility Command's KC-135s have been plagued by deteriorating performance which is causing shortfalls in current air refueling capability. Air Mobility Command is now forecasting the retirement of KC-135s to begin in FY2013. There is no plan to address air refueling capability shortfalls in the near-term. Additionally, there are some problems inherent to the assumptions Air Mobility Command planners are making about the replacement for the KC-135, dubbed KC-X.

This research paper accomplishes three tasks. First, it addresses the importance of air refueling to national security. This is accomplished by demonstrating air refueling's contribution to America's ability to rapidly project and employ power on a global scale. Secondly, this paper presents an explanation of current and forecast air refueling shortfalls. These shortfalls are presented in conjunction with Air Mobility Command's long-term plan to address these shortfalls and the weaknesses of Air Mobility Command's plans. Finally, this paper presents a unique solution to the current air refueling shortfalls—civilian contract air refueling.

Chapter 1

Introduction

> *Simply put, America's National Security Strategy, built on the imperative of world-wide engagement, demands nothing less than the best global transportation system the world has ever known, one capable of projecting U.S. strength and resolve—anywhere, anytime.*
>
> —General Charles T. Robertson, JR[1]

Our nation's ability to project and sustain military power over vast distances is a basic requirement to the maintenance of deterrence—the first-line of our national security.[2] General Charles T. Robertson, commander of United States Transportation Command, stressed the importance of rapid global mobility to our nation's capability to project and sustain military power.[3] Air refueling is a force multiplier that is inherently critical to achieving the rapid global mobility General Robertson described. As a force multiplier, air refueling bridges the gap between the CONUS and the various theaters of operations. This accelerates the deployment cycle and reduces dependency on forward staging bases and host nation support.

While deterrence is the first-line of our national security, the ability to win our nation's wars is the bottom-line of our national security.[4] Air refueling's second role, force enhancement, is critical to winning our nation's wars. As a force enhancer, air refueling extends the range, payload and loiter time of combat and combat support forces which allows fighters and bombers to attack strategic and tactical targets, deep in enemy territory, with greater payloads. It is these

two unique capabilities, force multiplication and force enhancement that render air refueling indispensable.

Air refueling capability has dwindled despite its importance to national security. A June 2000 General Accounting Office report on military readiness concluded that the DoD is 19% short of the air refueling capability required to execute wartime plans.[5] Additionally, AMC's Air Mobility Strategic Plan 2000 identified two deficiencies directly related to air refueling capabilities.[6] The first was increased depot maintenance cycle time for the aging KC-135 tanker fleet and the second was unknown KC-135 airframe service life.[7] Because of these deficiencies, Air Mobility Command planners predict a need to begin retiring KC-135s in fiscal year 2013. Currently, there is no replacement tanker on the drawing board or in the budget.

These shortfalls have spawned the research question; "Is it feasible and/or desirable for the Air Force to pursue a Civilian Contract Air Refueling (CCAR) capability?" CCAR is a unique concept that presents a near-term solution to Air Mobility Command's air refueling shortfall. The United States Air Force could realize three advantages from pursuing a CCAR capability. First, CCAR would fill a gap in wartime plan deficiencies—now and in the future. Second, CCAR would present receiver units a greater opportunity to maintain currency and proficiency at air refueling operations. Finally, CCAR would enhance air refueling flexibility and improve air power employment effectiveness.

This paper outlines the importance of air refueling, demonstrates the need for increased air refueling capability, determines the feasibility of CCAR and presents a cost benefit analysis of CCAR capability. In order to demonstrate CCAR's advantages, this paper has four basic sections: *Air Refueling – A National Resource* presents background information, *A State of Emergency* analyzes the issues responsible for the current air refueling capability shortfalls,

Civilian Contract Air Refueling: Innovative or Insane? presents an analysis of CCAR as a solution to current air refueling capability shortfalls, and finally, *Civilian Contract Air Refueling: A Near-Term Solution!* presents the benefits of using CCAR as a near-term solution and the resultant recommendation to pursue a CCAR capability.

Notes

[1] Air Mobility Command. *Air Mobility Strategic Plan 2000 Volume 1: Commander's Intent*, October 1999, 1.

[2] Joint Warfighting Center. *Joint Pub 1: Joint Warfare of the Armed Forces of the United States*, 10 January 1995, v.

[3] Air Mobility Command. *Air Mobility Strategic Plan 2000 Volume 1: Air Mobility Future Environment*, October 1999, 14.

[4] Joint Warfighting Center. *Joint Pub 1: Joint Warfare of the Armed Forces of the United States*, 10 January 1995, vi.

[5] United States General Accounting Office. *Air Transport Capability Falls Short of Requirements,* June 2000, 29.

[6] Air Mobility Command. *Air Mobility Strategic Plan 2000 Volume 3, Air Mobility Modernization Plan*, October 1999, 162-163.

[7] Ibid., 163.

Chapter 2

Air Refueling – A National Resource

No single innovation of recent times has contributed more to airpower flexibility than the aerial tanker…

—Major General Perry B. Griffith[1]

Air refueling capability is indispensable to our nation's ability to project power and deter aggression worldwide. Air Force Doctrine Document 2-6.2, *Air Refueling*, summarizes the importance of air refueling to power projection and employment; "Air refueling, when properly employed, enhances, enables, and multiplies the strategic, operational and tactical effects of any air operation."[2] This chapter is comprised of two sections: Air Refueling Doctrine and Air Refueling in Action. The first presents the complementary relationship between air refueling doctrine, the principles of war and the USAF's core competencies. The second is a historical presentation of major operations that relied heavily on air refueling.

Air Refueling Doctrine

Air and space power employment is guided by the principles of war and tenets of airpower, implemented through core competencies. Airmen must understand these fundamental beliefs as they apply to air and space power.

—Air Force Doctrine Document 1[3]

Air Refueling and the Principles of War[4]

Air refueling allows airpower forces to increase levels of *mass, surprise, economy of force, security,* and concentrates more assets for *offensive or defensive* operations. The overall effect of these applications is a force enhancer and force multiplier for airpower employment. For example, air refueling an attack aircraft en route to its target allows greater payloads which enhances airpower's ability to achieve *mass* and concentration of firepower deep in the enemy's battle space. Air refueling also allows attack aircraft to use indirect target approaches, terrain masking, and multiple axes of attack to capitalize on the advantage of *surprise*. Air refueling other support aircraft increases time aloft and decreases the number of aircraft and aircrews needed to build an air bridge or provide 24-hour command and control capability, thus achieving *economy of force*. Air refueling also enhances *maneuver* by providing additional fuel to attack aircraft which generates a valuable maneuver advantage during air-to-air engagements, while putting the enemy at a distinct disadvantage. The air refueling of mobility airlift aircraft presents another opportunity to achieve maneuver flexibility. Increasing the range and cargo load of airlift aircraft increases flexibility by allowing commanders to insert troops and cargo into theaters at decisive moments. This ultimately enables maximum utilization of resources and multiplies the force available, allowing greater persistence in engagements, operations, and campaigns. Finally, because air refueling increases range, airpower assets can be based beyond the effective range of enemy weapons. This increases *security* and frees up assets for *offensive or defensive* operations. Overall, proper application of air refueling enables airpower forces to increase levels of *mass, surprise, economy of force, security*, and concentrates more assets for *offensive or defensive* operations.

Air Refueling and the USAF's Core Competencies[5]

Air refueling enables and is enabled by the Air Force's six core competencies: rapid global mobility, precision engagement, global attack, air and space superiority, information superiority, and agile combat support.

Rapid Global Mobility. Air refueling's primary contribution to rapid global mobility is accomplished via deployment support. Air refueling allows deploying aircraft to fly nonstop to distant theaters of operations. This reduces reliance on en route staging bases for support. Additionally, tanker units deploy with almost all of their support equipment, personnel and supplies on board, allowing immediate operations with minimum impact on the airlift system.

Precision Engagement. Air refueling enhances precision engagement by increasing the range, payload, loiter time, and flexibility of airpower assets. Air refueling allows airlift aircraft to fly from the CONUS and deliver troops against an adversary or supplies into a disaster area. Air refueling also increases the loiter time of intelligence, surveillance and reconnaissance assets, decreasing the number of these assets required to support an operation while improving their ability to collect and disseminate information. Finally, air refueling enhances the ability for strike aircraft to employ precision weapons anywhere within the battle space.

Global Attack. Air refueling enables the global attack competency. It provides aircraft tasked with the global attack mission the capability to carry significant payloads to distant theaters, employ their weapons, and then recover to a secure landing base. Most global attack missions require multiple air refuelings.

Air and Space Superiority. Air refueling enhances air superiority. With air refueling, aircraft can be based further from the enemy and still perform their assigned missions. Distant basing reduces force protection concerns. This reduces the number of aircraft required for defensive operations which frees aircraft for offensive operations. Additionally, the increased

range afforded by air refueling multiplies the effects of offensive operations. With air refueling, attack aircraft can stay airborne longer and out-last an enemy aircraft's range and endurance. This increased loiter time provides a distinct advantage in the head-to-head battle for air superiority.

Information Superiority. Air refueling provides force multiplication for information, surveillance and reconnaissance (ISR) assets. The number of ISR assets is extremely limited. Air refueling increases ISR aircraft loiter time which reduces the number of aircraft required to support an operation. This makes the best use of the ISR assets that are available and ultimately maximizes their ability to accomplish information superiority missions.

Agile Combat Support. A key to agile combat support is a responsive transportation system. Air refueling provides force multiplication for mobility airlift aircraft. The increased range afforded by air refueling allows airlift aircraft to deploy from the CONUS directly to distant theaters of operations, eliminating the need for time consuming en route stops.

Air Refueling in Action

> *Air refueling means we can get anywhere very quickly, take off anywhere, attack anywhere and return anywhere, without landing en route. No spot on the globe is more than 20 hours flying from combat aircraft stationed in the United States.*
>
> —General Merrill A. McPeak[6]

Air refueling has demonstrated its importance numerous times throughout history. In June 1948, Strategic Air Command (SAC) stood up the first squadron of KB-29M Superfortress tankers and created an unmatchable force capable of worldwide power projection that was previously unknown.[7] As technology advanced, KB-29s were replaced with KC-97s, and, in 1957, KC-135s began replacing the KC-97s. The KC-135 quickly became the workhorse of America's tanker force and remains so today—44 years after its initial delivery. KC-135s

teamed with a growing fleet of B-52s became the backbone of America's nuclear deterrent. While tankers were the ultimate force enhancement tool for cold war nuclear deterrence, they have also been actively involved in every humanitarian and combat operation since Vietnam.

Vietnam

While the first combat use of air refueling occurred during the Korean War, Vietnam was the first major combat operation that clearly demonstrated the utility of air refueling. In just over 9 years, KC-135s flew 194,687 sorties, conducted 813,878 inflight refuelings, transferred 8,963,700,000 pounds of fuel and logged 911,364 flight hours.[8] In an article saluting air refueling's contribution to the prosecution of the Vietnam war John L. Frisbee wrote, "They made it possible for Guam-based B-52s to reach their targets and for fighters to range from one end of Vietnam to the other, greatly increasing the flexibility of tactical air operations. Fighter strikes in the northern route packages were totally dependent on the tankers."[9] Lt General Charles Horner, Vietnam veteran, and commander of the Coalition Air Forces during the Gulf War, stated;

> I think in any recent war, if you ask any fighter pilot who his hero is, he'd probably say the air-to-air tanker guys. I myself can remember in Vietnam being over Hainan Island, almost out of gas, and here comes a KC-135, way up north of where he ought to be because of the enemy threat… [10]

Air refueling's combat employment procedures matured throughout Vietnam and the cold war, paving the way for the most intensive operational use of air refueling to date—the Gulf War.[11]

Gulf War[12]

The buildup and execution of the Gulf War relied upon air refueling—in fact; 60 percent of the attack sorties required tanker support. Air refueling allowed the rapid deployment of fighter

aircraft and their support equipment to the theater; more than 1000 fighter aircraft, loaded with munitions, were deployed nonstop from the United States to Southwest Asia. Deployments covered 6900 nautical miles, took 15 hours flight time, and required 7 to 15 air refuelings. The ability to deploy nonstop allowed the first F-15s to be on alert in Saudi Arabia the day after notification and five fighter squadrons to arrive in the region within 5 days. During the 5-month buildup and 43-day execution of the Gulf War, Air Force tankers flew 141,000 hours, offloaded 1.2 billion pounds of fuel, completed 85,000 refuelings, and transported nearly 17,000 passengers and 6,500 tons of cargo.[13] The *Gulf War Air Power Survey Summary Report* clearly details the importance of air refueling to the buildup and execution of the Gulf War.

> Air operations without the extensive support of aerial tankers would have changed the character of the war… initial deployments to the theater would have been delayed… all dimensions of the air campaign would have been altered, [including] the number of sorties a day as well as the operating bases used… aerial tankers facilitated the speed and mass of the attacks and provided a margin of safety in air operations… the ability to refuel extensively permitted operations from distant, secure bases and provided a buffer of inestimable worth.[14]

In addition to refueling Coalition attack aircraft, tankers refueled the entire array of airborne warning, reconnaissance, targeting, and command and control aircraft that provided 24-hour coverage throughout Operations Desert Shield and Desert Storm.

Post-Gulf War

Since the Gulf War, air refueling has been used extensively for a wide range of operations. In 1995 tankers flew 383 Operation Deliberate Force support-sorties that made the North Atlantic Treaty Organization's 17-day air campaign possible. These air refueling flights comprised nearly 11% of the total missions flown during Deliberate Force.[15] More recently, tankers flew 4,347 sorties offloading 188,100,000 pounds of fuel to over 17,750 receivers during Operation Allied Force.[16]

Notes

[1] Perry B. Griffith. "Seven League Boots for TAC," *The Airman*, IV, No. 8, August 1960, 44.

[2] Air Force Doctrine Center. *AFDD 2-6.2: Air Refueling*, 19 July 1999, 9.

[3] Air Force Doctrine Center. *AFDD 1: Air Force Basic Doctrine*, September 1997, 11.

[4] The information presented in this section is derived entirely from AFDD 2-6.2. *Air Refueling*, 19 July 1999, 5.

[5] The information presented in this section is derived entirely from AFDD2-6.2, *Air Refueling*, 19 July 1999, 8-9.

[6] Keith W. Moncrief. *Tactical Air Refueling: Undocumented Past, Future Requirement*, November 1996, 9.

[7] Dennis Casey and Bud Baker. *Fuel Aloft: A Brief History of Aerial Refueling*, 199?, 14.

[8] Vernon B. Byrd. *Passing Gas; The History of Inflight Refueling*, 1994, 177.

[9] John L. Frisbee. "Tribute to Tankers," *Air Force Magazine,* January 1996, 49.

[10] Keith W. Moncrief. *Tactical Air Refueling: Undocumented Past, Future Requirement*, November 1996, 20.

[11] Air Force Doctrine Center. *AFDD 2-6.2: Air Refueling*, 19 July 1999, 1.

[12] Except where otherwise noted, the quantitative information in this section was derived from: Thomas A. Keaney and Eliot A. Cohen. *Gulf War Air Power Survey Summary Report*, 1993, 190-191.

[13] Air Force Doctrine Center. *AFDD 2-6.2: Air Refueling*, 19 July 1999, 1.

[14] Thomas A. Keaney and Eliot A. Cohen. *Gulf War Air Power Survey Summary Report*, 1993, 229.

[15] Colonel Robert C. Owen. *Deliberate Force: A Case Study in Effective Air Campaigning,* January 2000, 220.

[16] Major David M. Cohen. *The Vital Link: The Tanker's Role in Winning America's Wars,* April 2000, 13.

Chapter 3

A State of Emergency

> *If there were no falsehoods in the world, there would be no doubt, if there were no doubt, there would be no inquiry; if no inquiry, no wisdom, no knowledge, no genius.*
>
> —Walter Savage Landor[1]

Air refueling capability has dwindled despite its proven importance to national security. A June 2000 General Accounting Office report on military readiness concluded that the DoD is 19% short of the air refueling capability required to execute wartime plans.[2] As air refueling shortfalls approach a state of emergency, air refueling visionaries are focused on a long-term solution; the next generation tanker, dubbed KC-X, which is scheduled to enter the inventory in 2013. However, the shortfall exists today and needs to be address with a near-term solution.

Analyzing the Air Refueling Emergency

> *The Defense Department would need a one-third increase in budget simply to maintain the forces and capability it already has.*
>
> —Secretary of the Air Force, F. Whitten Peters[3]

The following examines current air refueling capability and force structure with an emphasis on AMC's long-term solution to air refueling shortfalls. Moreover, it examines four factors that complicate AMC's long-term solution: force structure determination, one-for-one KC-135

replacement, timeline for KC-X delivery, and unknown KC-135 service life, all of which open the door for a unique near-term solution—Civilian Contract Air Refueling.

Quantifying Air Refueling Capability

The current air refueling capability is defined by two measures of effectiveness: the number of tankers required and the amount of fuel offload required. Historically, boom-intensive operations make the number of tankers available the most critical measure of effectiveness during the employment, or strike, phase of a campaign. The following chart shows Air Mobility Command's current and forecast air refueling capability as a function of aircraft availability.

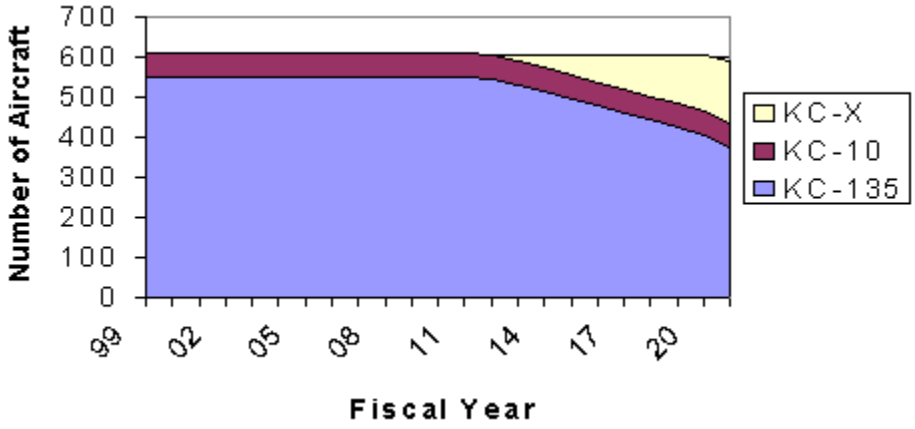


Figure 1 - Air Refueling Capability as a Function of Aircraft Availability[4]

As the preceding chart depicts there are 547 KC-135s and 59 KC-10s in the Air Force inventory. In 2013, AMC expects to begin replacing KC-135s with KC-Xs on a one-for-one basis, keeping the overall number of tankers at approximately 600.

During the deployment phase of operations, fuel available for offload is the critical measure of effectiveness because CONUS-based fighting forces require large fuel onloads to fly non-stop to distant theaters of operation. The following chart shows Air Mobility Command's current and forecast air refueling capability as a function of fuel offload available.

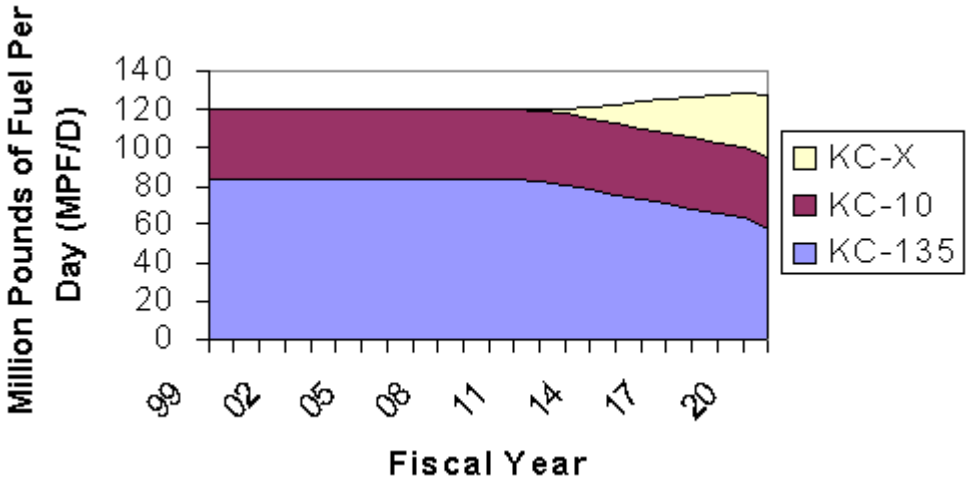


Figure 2 - Air Refueling Capability as a Function of Fuel Offload[5]

As the preceding chart depicts, the current offload capacity is 120 million pounds of fuel per day. Furthermore, it assumes offload capability will increase in 2013 when KC-Xs replace KC-135s on a one-for-one basis.

Evaluating Current and Future Air Refueling Capability

The tanker fleet must be able to support the requirements for both fuel offload and aircraft availability. According to a June 2000 General Accounting Office Report on Military Readiness, the KC-135 fleet falls below the required mission capability rates for ensuring execution of wartime plans. In fact, the GAO's findings state that KC-135s maintained a 67% mission capability rate for execution of wartime plans as opposed to the 85% mission capability requirement.[6] While this rate is significantly lower than the requirement, AMC officials claim they could implement management practices to improve mission capability. AMC cited deferring depot maintenance, accelerating aircraft through their final days of depot maintenance, and flying some aircraft with missing or broken parts, which would not affect flight safety but would normally make them not mission capable, as practices that could improve mission capability rates.[7] While these actions would improve the mission capability rates, the duration

they could be sustained and the extent to which they would counter the nearly 20% shortfall is not quantified by AMC officials.[8] The following charts depict the GAO's findings:

Type of aircraft	Total number of aircraft	Total mission authorized aircraft[a]	Standard mission capable rates[b]	Equivalent number of aircraft needed[c]	Equivalent number of aircraft mission capable[d]	Average aircraft mission capable rates[e]	Number of aircraft short (over)
C-5	126	104	75	78	57	55	21
C-17	52	44	87.5	39	29	66	10
C-141	172	135	80	108	83	61	25
KC-135	546	472	85	402	317 [f]	67 [f]	85 f
KC-10	59	48	85	41	42	88	(1)

[a]Excludes aircraft in inventory reserved for backup and training.

[b]Percentage of mission authorized aircraft needed to meet wartime requirements.

[c]The mission capable rate times the number of mission authorized aircraft.

[d]The equivalent number of aircraft is based on the number of mission capable hours that units reported.

[e]Actual percentage of authorized aircraft that are mission capable is based on the number of mission capable hours that units report.

[f]Air Mobility Command only tracks 442 KC-135 authorized aircraft and 30 KC-135s are assigned to other commands. The 67-percent average mission capable rate for 442 aircraft was used to compute the mission capable numbers for all 472 aircraft.

Figure 3 - Air Mobility Command Airlift and Aerial Refueling Aircraft Data[9]

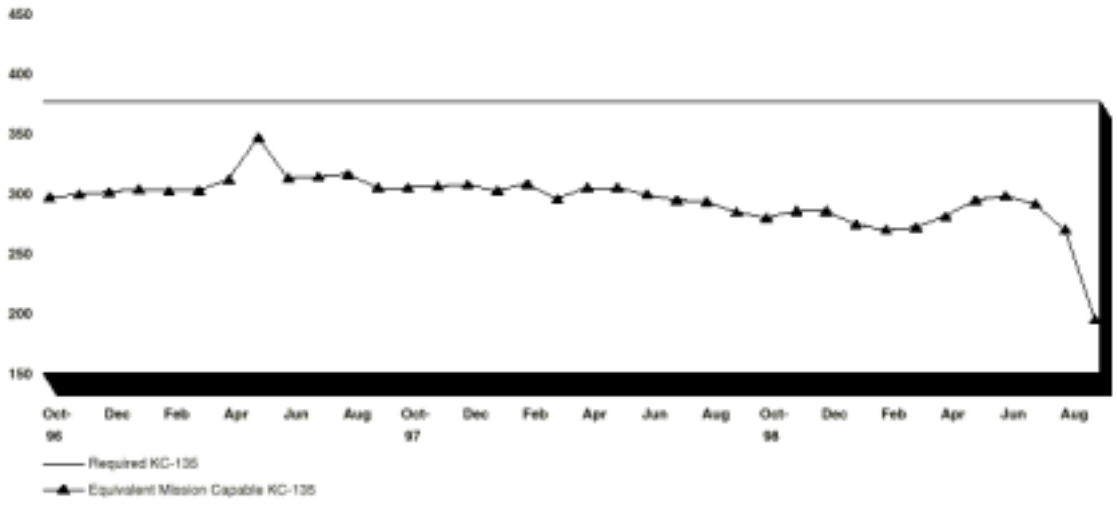


Figure 4 - KC-135 Air Mobility Command Aircraft Required and Mission Capable Rates, Fiscal Years 1997-99[10]

The preceding charts show the KC-135 mission capable rate of 67 percent, which, when coupled with KC-10's 88 percent mission capable rate still leaves AMC 84 aircraft short of wartime plan requirements.

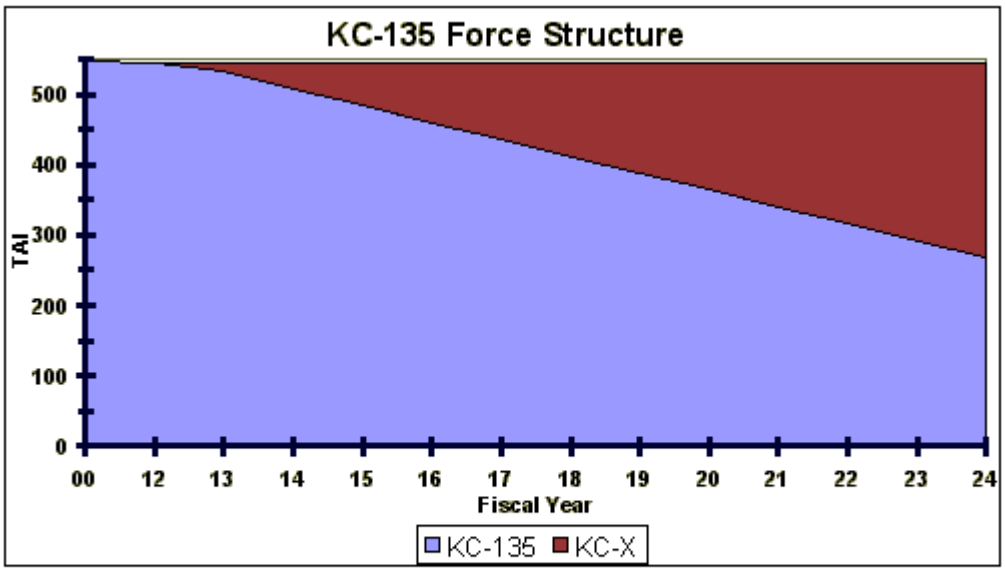
The low mission capable rates for KC-135s are attributed to two factors, increased depot-level maintenance cycle times and availability of spare parts. Since 1991, depot-level maintenance cycle times have doubled. Air Force Secretary Peters described the dilemma to Washington reporters, "40% of the 40-year old KC-135R tanker fleet is down for repairs at any given time… it takes a year to get a KC-135 through depot maintenance because of all the age-related problems discovered during the periodic overhauls."[11] Shortage of spare parts has plagued KC-135 operations for nearly a decade. General Michael Ryan, the Chief of Staff of the United States Air Force, addressed the issue before the Senate Armed Services Committee in September of 2000, "A lack of parts permeates several aspects of readiness: mission capable rates, cannibalization rates, and added work-hours for our people who try to meet mission demands without the equipment that they need."[12]

Force Structure

KC-10. The newest aircraft in the air refueling fleet is the KC-10 with an average age of 13 years. The 59 KC-10s comprise only 10% of the Air Force's tanker fleet, but, because of their large offload capability, account for 33% of the fuel available for offload. In addition to the KC-10's air refueling role, it also comprises 12% of the total military organic airlift capability. The crew ratio for the KC-10 is 2.0 for active duty units and 1.5 for associate reserve units. There are no plans to replace the KC-10 through FY2025.

KC-135. The oldest aircraft in the USAF's inventory is the KC-135, with an average age of 41 years. The 547 KC-135s comprise 90% of the Air Force's tanker fleet, but only account for 67% of the fuel available for offload capability. The crew ratio for CONUS based active duty KC-135 units is 1.36, for OCONUS active duty, Air National Guard and Air Force Reserve Component forces the crew ratio is 1.27. Air Mobility Command planners are currently planning

on beginning KC-135 replacement in FY2013. Their current force structure plan is presented in the following charts.



FY	00	12	13	14	15	16	17	18	19	20	21	22	23	24
KC-135	547	544	532	508	484	460	436	412	388	364	340	316	292	268
KC-X			12	36	60	84	108	132	156	180	204	228	252	276

Figure 5 - KC-135 Force Structure[13]

This chart shows 12 KC-Xs entering service in FY2013 with a continuing replacement, on a one-for-one basis until all the KC-135s are retired in FY2040.

Evaluating Force Structure

There are four elements within Air Mobility Command's force structure model that bear examination: force structure determination, the concept of a one-for-one replacement, the timeline for KC-X delivery, and the unknown service life of KC-135s.

Force Structure Determination. Despite the value of tankers to airpower projection and engagement, a rather indirect approach is used to determine the tanker force structure. Air Mobility Command's *Strategic Master Plan 2000* highlights the shortfalls of this approach:

> The tanker requirements study justified the current tanker force structure and identified significant shortfalls in both aircraft and aircrews. This study was based on the requirement statement found in the FY99-03 Defense Planning Guidance (DPG). Unfortunately, the air refueling requirement was omitted from the FY00-05 and FY01-05 DPG. This omission also eliminated the basis used for determining the tanker requirement.
>
> The current FY01-05 DPG directs the Air Force to program "to sustain at least the current air refueling support forces (KC-10 and KC-135 aircraft) through the FYDP (Future Years Defense Plan) period." This document no longer contains an actual "requirement" but a fiscally constrained statement that equals the current capability. Primarily due to a large number of PMAI (Primary Mission Aircraft Inventory) aircraft (547 KC-135s and 59 KC-10s), it is widely assumed that tanker support will be available for all contingencies. However, depending upon the scenarios addressed, previous studies have identified significant capability shortfalls in both aircrews and aircraft.[14]

One-for-one Replacement. AMC planners assume a one-for-one replacement of the KC-135 with the KC-X. While a large requirement for aircraft availability exists, no aircraft replacement in recent history has been procured on one-for-one replacement basis. In fact, the actual procurement numbers of the KC-10, B-1, B-2 and the C-17 have all fallen well short of the numbers the Air Force said it needed. Robert Wall, in his article *USAF Reviews KC-135 Life Expectancy*, noted that "the number of KC-Xs the Air Force would buy to replace the more than 500 KC-135s is still undetermined."[15] Brigadier General Paul W. Essex, who oversees the USAF airlift and tanker acquisition programs at the Pentagon, is wrestling with the KC-X procurement issue. He believes the KC-X will be more efficient than the KC-135, allowing fewer aircraft to provide a greater amount of offload availability; "a new aircraft would be more efficient and allow for a higher utilization rate, which makes a one-for-one replacement unlikely." Yet, General Essex also recognizes the need for "booms in the air" which drives a large tanker fleet for aircraft availability, "A relatively large number of aircraft would be required because worldwide tanker support couldn't be accommodated with a small fleet."[16] General Tony Robertson, addressing the House Armed Services readiness subcommittee in

October of 2000, emphasized the availability issues that arise when a large force is replaced by a smaller one, "Even though tonnage capabilities remain close to the same, we lose tremendous flexibility with so many fewer tails. The 135 C-17s can only be in half as many places as 270 C-141s."[17] The plan presented in AMC's *Air Mobility Strategic Master Plan* fails to account for the possibility that the KC-135 will not be replaced on a one-for-one basis by the KC-X and should investigate a solution that accounts for this very likely contingency.

Timeline for KC-X Delivery. AMC's *Air Mobility Strategic Plan 2000* presents a KC-135 replacement model that assumes the design, testing, procurement and training cycles for the KC-X will be complete by fiscal year 2013. While replacing KC-135s is near the top of the Air Force's priority list, a procurement cycle of this proportion has not been accomplished, in this short a time, for any major weapon system in recent history. As Secretary of the Air Force F. Whitten Peters pointed out, "we have no significant replacement programs on the books for our aging tankers."[18] Given the magnitude of this undertaking, AMC needs to account for the likely contingency that the KC-X will not enter service in FY2013.

Unknown Service Life. Currently the service life of the KC-135 is unknown. AMC's *Air Mobility Strategic Plan 2000* points out that the major limiting factor for structural service life of the KC-135 is corrosion.[19] The Pentagon is conducting an economic service life study because previous studies failed to include corrosion as a factor. As a result of this study, AMC may have to accelerate the retirement of the KC-135 fleet and the procurement of the KC-X fleet.[20] Additionally, the current AMC replacement plan counts on the KC-135 continuing service until FY2040. In light of current plans, which indicate half of the tanker force will still be KC-135s in FY2025, AMC's retirement plan will need updating once the valid service life of the KC-135 is established.

Operations Tempo and Crew Manning

The combination of increased operations tempo and the lowest manning authorizations of any major weapon system causes problems for both retention and execution of wartime plans. At Grand Forks AFB, for example, KC-135 crews are deployed, on the average, 137 days per year.[21] This can aggravate crew retention problems because crews are required to be away from their families for extended periods. Not only do crew manning and operations tempo combine to cause retention problems, they also effect wartime plan execution. According to Lt. Col. Scott Wilhelm, chief of the modeling branch in the AMC office of studies and analysis, the current KC-135 crew manning will leave the Air Force unprepared to meet wartime demands, "There would not be enough crews to do what we want to do."[22] During Operation Allied Force, the Air Force had to resort to an early presidential call-up of KC-135 crews because there were not enough active duty crews to meet the need.[23] In fact, four reserve tanker units were activated under the Presidential Selective Reserve Call-up to execute a 78-day air campaign.[24]

Summarizing the Air Refueling Emergency

The above discussion presents two factors that are critical to understanding the air refueling emergency. First, and foremost, the air refueling shortfall is now! The KC-135 is an extremely old airframe, depot-level maintenance takes over a year, aircraft availability is decreasing and mission capable rates are plummeting. Secondly, the shortfalls in aircraft availability will continue after the KC-X is purchased. In all likelihood, AMC will not receive a one-for-one exchange for KC-135s, nor would the exchange be instantaneous. Therefore, even if the KC-X delivers an increase in efficiencies that leads to greater fuel availability for the deployment phase of operations, it will not solve the aircraft availability issues associated with the employment phase of operations. Furthermore, KC-135s will still account for half the tanker fleet in 2025 and

the problems associated with its maintainability will continue to be persistent. These factors necessitate a near-term solution to the air refueling emergency.

Notes

[1] George Seldes. *The Great Thoughts,* 1985, 235.

[2] United States General Accounting Office. *Air Transport Capability Falls Short of Requirements,* June 2000, 29.

[3] Air Mobility Command. *Air Mobility Command Update*, December 2000, 12.

[4] Air Mobility Command. *Air Mobility Strategic Plan 2000 Volume 2, Air Mobility Performance Plan*, October 1999, 54.

[5] Ibid., 55.

[6] United States General Accounting Office. *Air Transport Capability Falls Short of Requirements,* June 2000, 30.

[7] Ibid., 34.

[8] Ibid., 34.

[9] Ibid., 32

[10] Ibid., 34

[11] Air Mobility Command. *Air Mobility Command Update*, December 2000, 12.

[12] General Michael Ryan. *Statement before the Senate Armed Services Committee*, September 2000, 6.

[13] Air Mobility Command. *Air Mobility Strategic Plan 2000 Volume 3, Air Mobility Modernization Plan*, October 1999, 161.

[14] Ibid., 161.

[15] Robert Wall., "USAF Reviews KC-135 Life Expectancy," *Aviation Week & Space Technology*, October 16, 2000, 54.

[16] Ibid., 54.

[17] Author Unknown. "A Clamor for Airlift," *Air Force Magazine*, December 2000, 29.

[18] Ibid., 27.

[19] Air Mobility Command. *Air Mobility Strategic Plan 2000 Volume 3, Air Mobility Modernization Plan*, October 1999, 163.

[20] Robert Wall., "USAF Reviews KC-135 Life Expectancy," *Aviation Week & Space Technology*, October 16, 2000, 54.

[21] Seena Simon. "AMC Again asks for More Funding for KC-135 Crews," *Air Force Times*, December 11 2000, 10.

[22] Ibid., 10.

[23] Ibid., 10.

[24] James E. Sherrard III. "Reserve Essential Part of Military Strategy and Capability," *Officer,* Jan/Feb 2000, 52-53.

Chapter 4

Civilian Contract Air Refueling: Innovative or Insane?

> *The single greatest power in the world today is the power to change. The most recklessly irresponsible thing we could do in the future would be to go on exactly as we have in the past ten or twenty years.*
>
> —Karl W. Deutsch[1]

The most significant oversight in Air Mobility Command's plans for addressing the air refueling emergency is a failure to develop a near-term solution. The shortfall exists today, it will not improve tomorrow, it might get worse before the next generation tanker is delivered, and it is likely the shortfall will not improve entirely after the next generation tanker is delivered. Secretary of the Air Force, F. Whitten Peters described his concerns:

> We have no significant replacement programs on the books for our aging tankers. It is not that we aren't going to have the tankers immediately, but what we are seeing on the KC-135 fleet are what appears to be an increasing mission incapable rate due to technical surprises… These are the kinds of problems which can put a whole fleet down or 200 aircraft down overnight for a period of time and those are the kinds of worries we have.[2]

Solving the Air Refueling Emergency

In August 1997 USCINCTRANS, General Walter Kross, directed a feasibility study for a Civilian Contract Air Refueling proposal. Unfortunately, the CCAR proposal was limited to contracting for probe and drogue-type refueling only. The feasibility study concluded that a 1% increase in wartime capability would cost approximately $25.5 million annually.[3] Because of the

costs associated with a relatively small increase in wartime capability, excitement for the CCAR concept did not exist at USTRANSCOM or AMC. Undoubtedly, the CCAR proposal that USTRANSCOM studied did not present a viable solution to the air refueling shortfalls. However, it provides four valuable lessons for a CCAR force: CCAR operations are feasible, CCAR operations must be capable of accomplishing boom and probe/drogue-type refuelings, CCAR operations are best suited for deployment and training operations, and CCAR operations are cost effective.

CCAR Feasibility

First, and foremost, the USTRANSCOM report established that CCAR operations are feasible. In its concluding remarks, the USTRANSCOM report states, "there are no known equipment or technical obstacles to preclude program development."[4] The accuracy of this statement was demonstrated in the fall of 2000 when Omega Air Inc., an internationally based company specializing in aircraft sales, leasing, and parts, used a modified Boeing 707 to refueled a Navy FA-18C.[5] Omega Air Inc., received FAA certification for the operation, contracted for their own insurance, and paid the Naval Air Warfare Center Aircraft Division $1 million to certify the Boeing 707 for air refueling operations. Following this successful demonstration the Navy entered into a contract with Omega Air Inc. to provide civilian contract air refueling for their training operations. In addition to their 707s, Omega Air Inc. owns a fleet of about 20 DC-9s and DC-10s that could be modified for air refueling operations and recently, the president of Omega Air Inc., Gale Matthews voiced interest in purchasing KC-135s for use in their air refueling program.[6] Clearly, CCAR operations are feasible.

CCAR Operational Suitability

CCAR operations are best suited for deployment and training missions. USTRANSCOM's Concept Development Report concluded "due to legal, policy, and liability considerations, the primary utility of contracted aerial refueling is in training and deployment operations outside areas of hostilities."[7]

CCAR Capability Requirements

CCAR capability must include boom-type refueling capability, not just probe and drogue. The reasons for this are twofold. First, AMC annual probe and drogue missions do not exceed 2,000 hours.[8] These hours account for a small portion of the nearly 85,000 training hours allocated to tankers and, when divided among the 800 tanker crews, is highly valuable for currency and proficiency.[9] AMC cannot afford to lose a significant portion of this training to a civilian contractor. Secondly, the preponderance of probe and drogue requirements arises during combat strike operations for which CCAR is not suitable. USTRANSCOM's finding, about probe and drogue operations, is valid, "AMC does not have a sufficient amount of peacetime probe and drogue refueling business to sustain a useful contracted A/R fleet."[10]

CCAR Operations are Cost Effective

The USTRANSCOM report presented initial cost options for CCAR operations that ranged from $4,862 to $9,878 per flying hour and noted that "the figures are not meant to be analyzed from a contract perspective… but rather as benchmarks for report purposes."[11] Since USTRANSCOM completed their report in 1999, Omega Air Inc. refined their cost estimate to about $5,500 per flying hour and recently entered into a contract with the Navy to provide air refueling for $5,995 per hour.[12] The KC-135R cost per flying hour was $2,232 in FY99 and increased by over 50% between FY99 and FY01 to its current cost of $3,673 per flying hour

primarily because of maintainability issues.[13] While the cost projections Omega Air Inc. presented for CCAR operations is higher than reimbursement rates for KC-135Rs, it is proportionately lower than KC-10s. According to *AFI 65-503: US Air Force Cost and Planning Factors*, the FY01 reimbursement rate for KC-10s is $7,527 per flying hour.[14] At approximately $5,500 per flying hour, the cost of CCAR operations fits squarely in the middle of organic air refueling costs ($3,673 – $7,527 per flying hour) and, when compared to reimbursement rates for organic tankers, CCAR presents a cost effective option.

Notes

[1] George Seldes. *The Great Thoughts,* 1985, 105.

[2] Author Unknown. "A Clamor for Airlift," *Air Force Magazine*, December 2000, 28.

[3] United States Transportation Command – TCJ5. *Concept Development Report on Contracted Aerial Refueling*, Revised 21 June 1999, 15.

[4] Ibid., 15.

[5] Sandra I. Erwin. "Navy Considering Commercial Tanker Lease," *National Defense*, October 2000, 24.

[6] E-mail correspondence between Mr Matthews and the author, 12 Mar 2001.

[7] United States Transportation Command – TCJ5. *Concept Development Report on Contracted Aerial Refueling*, Revised 21 June 1999, 15.

[8] Ibid., 15.

[9] HQ Air Mobility Command, Directorate of Operations and Transportation. *AMC Flying Hour Program,* September 2000, 1.

[10] Ibid., 15.

[11] Ibid., 13-14.

[12] Sandra I. Erwin. "Navy Considering Commercial Tanker Lease," *National Defense*, October 2000, 24. The cost data for the Navy contract was provided via e-mail correspondence between Omega Air Inc president and the author on 12 Mar 2001.

[13] Deputy Assistant Secretary of the Air Force, Cost and Economics. *AFI 65-503: US Air Force Cost and Planning Factors*, 4 February 1994, Table A15-1, 3.

[14] Ibid., 3.

Chapter 5

Contract Air Refueling: A Near-Term Solution!

> *I think and think for months and years. Ninety-nine times, the conclusion is false. The hundredth time I am right.*
>
> —Albert Einstein[1]

The importance of air refueling to air power employment cannot be stressed enough, Keith Hutcheson, in his book *Air Mobility: The evolution of Global Reach*, records air refueling's contribution masterfully,

> A robust aerial refueling force provides numerous force multipliers that are critical in today's global environment. It gives virtually 'unlimited' range to any air asset (bomber, fighter, airlift, special forces, or rescue) that has aerial refueling capability—U.S. or allied… it gives military leaders tremendous flexibility in both planning and execution. It makes one fighter capable of doing the job of several by increasing the time it can stay aloft and the number of targets it can strike. It permits heavy airlift aircraft to carry greater payloads over much longer distances in significantly less time. An aerial refueling force makes all U.S. military forces (Army, Navy Marine, and Air Force) more influential and more capable. Aerial refueling is an incredible force multiplier.[2]

Civilian Contract Air Refueling: The Findings

Civilian Contract Air Refueling is a unique concept that presents a near-term solution to Air Mobility Command's air refueling shortfall. The United States Air Force could realize three advantages from pursuing a CCAR capability. First, CCAR would fill air refueling deployment gaps in wartime plan deficiencies—now and in the future. Second, CCAR would present

receiver units a greater opportunity to maintain currency and proficiency at air refueling operations. Finally, CCAR would enhance air refueling flexibility and improve air power employment effectiveness.

CCAR Fills the Gap in Wartime Plan Deficiencies

AMC needs a cost-effective near-term measure to fill the gap in wartime plans and to relieve the peacetime operations tempo. As previously stated, the KC-135's increased depot-level maintenance cycles have decimated peacetime aircraft mission capability rates to nearly 20% below those acceptable for wartime mission accomplishment.[3] Additionally, the service life of the KC-135 is still unknown, operations tempo is at an all-time high and AMC says crew manning is at a level below that required for mission execution.[4] Finally, AMC does not have a plan to fill near-term requirements and, their long-term KC-135 replacement plan ignores the historical and financial realities of garnering a one-for-one replacement for any major weapon system. A CCAR force would help placate these shortcomings.

CCAR Increases Training Opportunities

A CCAR capability serves two roles: force deployment and training enhancement. In its force deployment role, CCAR would be available to relieve air refueling tanker taskings and ensure AMC's ability to execute wartime plans. Additionally, CCAR could be used to relieve tanker taskings during air expeditionary force swap-outs—giving over-tasked tanker crews a relief from the demanding operations tempo. In the training role, CCAR is available to meet receiver air refueling currency and proficiency requirements.

CCAR Increases Air Power Flexibility

Air refueling, when properly employed, enhances, enables, and multiplies the strategic, operational and tactical effects of any air operation.[5] Air refueling allows airpower forces to increase levels of mass, surprise, economy of force, security and concentrates more assets for offensive and defensive operations. Since its inception, air refueling has been the force multiplier that is inherently critical to achieving the rapid global mobility essential to maintaining deterrence—our first line of national security. Moreover, air refueling's second role, force enhancement, is critical to winning our nation's wars—the bottom-line of our national security.[6] Increasing the availability of air refueling assets with a CCAR capability is of insurmountable value to the flexibility required in peacetime operations and wartime mission execution. Undoubtedly, a CCAR capability would increase that flexibility and capability.

Civilian Contract Air Refueling: The Desired End State

Given the magnitude of air refueling's importance to our national security and the dwindling state of our air refueling capability the recommendation is singular: USTRANSCOM, in conjunction with AMC should actively pursue a civilian contract air refueling capability.

Notes

[1] Peggy Anderson. Great Quotes from Great Leaders, 1990, 90.
[2] Keith Hutcheson. *Air Mobility: The Evolution of Global Reach,* 1999, 11.
[3] United States General Accounting Office. *Air Transport Capability Falls Short of Requirements,* June 2000, 29.
[4] Seena Simon. "AMC again asks for more funding for KC-135 crews," *Air Force Times*, December 11 2000, 10.
[5] Air Force Doctrine Center. *AFDD 2-6.2: Air Refueling*, 19 July 1999, 9.
[6] Joint Warfighting Center. *Joint Pub 1: Joint Warfare of the Armed Forces of the United States*, 10 January 1995, vi.

Glossary

AMC	Air Mobility Command
CCAR	Civilian Contract Air Refueling
CONUS	Continental United States
DOD	Department of Defense
DPG	Defense Planning Guidance
FYDP	Future Years Defense Plan
GAO	General Accounting Office
ISR	Information, Surveillance and Reconnaissance
KC-X	Next Generation Tanker
NATO	North Atlantic Treaty Organization
OCONUS	Outside the Continental United States
PMAI	Primary Mission Aircraft Inventory
USAF	United States Air Force
USTRANSCOM	United States Transportation Command

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